WHAT IS CLAIMED IS:

1. A magnetic head actuator comprising:

a head-holding substrate having a pair of movable arms for holding a magnetic head; and

piezoelectric elements fixed along the pair of movable arms to move the pair of movable arms in response to an applied voltage,

wherein the head-holding substrate comprises a fired glass-ceramic compact and all surfaces of the substrate are fired.

2. A magnetic head actuator according to Claim 1, wherein the fired glass-ceramic compact comprises at least one of SiO_2, B_2O_3, and Al_2O_3.

3. A magnetic head actuator according to Claim 2, wherein the fired glass-ceramic compact has a mechanical strength of 200 MPa or more.

4. A magnetic head actuator according to Claim 3, wherein the fired glass-ceramic compact has a glass component comprising PbO, B_2O_3, SiO_2, CaO, and a ceramic component comprising Al_2O_3.

5. A magnetic head actuator according to Claim 3, wherein the fired glass-ceramic compact has a glass component comprising MgO, Al_2O_3, SiO_2, B_2O_3, and a ceramic

component comprising SiO_2.

6. A magnetic head actuator according to Claim 3, wherein the fired glass-ceramic compact has a glass component comprising B_2O_3, SiO_2, and a ceramic component comprising Al_2O_3.

7. A magnetic head actuator according to Claim 3, wherein the fired glass-ceramic compact comprises CaO, Al_2O_3, and SiO_2.

8. A magnetic head actuator according to Claim 3, wherein the fired glass-ceramic compact has a glass component comprising Li_2O, SiO_2, MgO, Al_2O_3, and a ceramic component comprising SiO_2 and Al_2O_3.

9. A magnetic head actuator according to Claim 1, wherein the piezoelectric elements are formed on the head-holding substrate by printing and are fired at a lower temperature than the sintering temperature of the fired glass-ceramic compact.

10. A magnetic head actuator according to Claim 9, wherein the piezoelectric elements comprise PZT.

11. A method for manufacturing a magnetic head actuator, comprising:

preparing a glass-ceramic green sheet;

processing the glass-ceramic green sheet into a desired shape;

firing the glass-ceramic green sheet by non-shrinkage firing to provide a fired glass-ceramic sheet for head-holding substrates, all surfaces of the fired glass-ceramic sheet being fired;

forming a pair of piezoelectric elements on each head-holding substrate by printing with a piezoelectric material having a lower sintering temperature than that of the fired glass-ceramic sheet; and

firing the pair of piezoelectric elements at a lower temperature than the sintering temperature of the fired glass-ceramic sheet.

12. A method for manufacturing a magnetic head actuator according to Claim 11, wherein the glass-ceramic green sheet comprises a glass-ceramic material powder containing at least one of SiO_2, B_2O_3, and Al_2O_3.

13. A method for manufacturing a magnetic head actuator according to Claim 12, wherein the fired glass-ceramic sheet has a mechanical strength of 200 MPa or more.

14. A method for manufacturing a magnetic head actuator according to Claim 13, wherein the fired glass-ceramic sheet has a glass component comprising PbO, B_2O_3, SiO_2, CaO, and a ceramic component comprising Al_2O_3.

15. A method for manufacturing a magnetic head actuator according to Claim 13, wherein the fired glass-ceramic sheet has a glass component comprising MgO, Al_2O_3, SiO_2, B_2O_3, and a ceramic component comprising SiO_2.

16. A method for manufacturing a magnetic head actuator according to Claim 13, wherein the fired glass-ceramic sheet has a glass component comprising B_2O_3, SiO_2, and a ceramic component comprising Al_2O_3.

17. A method for manufacturing a magnetic head actuator according to Claim 13, wherein the fired glass-ceramic sheet comprises CaO, Al_2O_3, and SiO_2.

18. A method for manufacturing a magnetic head actuator according to Claim 13, wherein the fired glass-ceramic sheet has a glass component comprising Li_2O, SiO_2, MgO, Al_2O_3, SiO_2, and a ceramic component comprising Al_2O_3.

19. A method for manufacturing a magnetic head actuator according to Claim 11, wherein the pair of piezoelectric elements comprise PZT.

20. A method for manufacturing a magnetic head actuator according to Claim 11, wherein, in the step of processing the glass-ceramic green sheet into a desired shape, openings are formed in the glass-ceramic green sheet by laser processing to define the shape of the head-holding

substrates.

21. A method for manufacturing a magnetic head actuator according to Claim 11, wherein, in the step of processing the glass-ceramic green sheet into a desired shape, openings are formed in the glass-ceramic green sheet by pressing to define the shape of the head-holding substrates.

22. A method for manufacturing a magnetic head actuator according to Claim 20, wherein the openings define a stationary portion of each head-holding substrate, and a pair of movable arms that extend from both ends of each stationary portion to hold a magnetic head at free ends of the pair of movable arms.

23. A method for manufacturing a magnetic head actuator according to Claim 21, wherein the openings define a stationary portion of each head-holding substrate, and a pair of movable arms that extend from both ends of each stationary portion to hold a magnetic head at free ends of the pair of movable arms.

24. A method for manufacturing a magnetic head actuator according to Claim 11, wherein multiple head-holding substrates are defined in the fired glass-ceramic sheet at the same time and, before the step of firing the pair of piezoelectric elements, the fired glass-ceramic sheet is cut to separate the head-holding substrates.

25. A hard disk drive, comprising:

a magnetic disk rotatable about a central axis by a motor;

a course adjustment shaft supporting the base of a swing arm, pivotable about the coarse adjustment shaft;

a swing arm actuator operatively connected to the swing arm;

a magnetic head actuator disposed at an end of the swing arm distal from the coarse adjustment shaft;

the magnetic head actuator having a head-holding substrate having a pair of movable arms for holding a magnetic head; and

piezoelectric elements fixed along the pair of movable arms to move the pair of movable arms in response to an applied voltage,

wherein the head-holding substrate comprises a fired glass-ceramic compact and all surfaces of the substrate are fired.

26. An apparatus for accurately positioning a magnetic head, comprising:

a magnetic head-holding structure;

a coarse adjustment mechanism that positions the magnetic head with respect to a magnetic medium; and

a fine adjustment mechanism being actuated by a piezoelectric element incorporated in the magnetic head-holding structure,

wherein the fine adjustment mechanism comprises a fired glass-ceramic compact and all surfaces of the substrate are fired.

27. A means for accurately positioning a magnetic head with respect to a recording medium, comprising:

means for holding the magnetic head;

means for coarsely adjusting the magnetic head position; and

means for finely adjusting the magnetic head position.

28. A means for increasing the spatial density of magnetic data recording and reproduction, comprising:

means for recording and reproducing data;

means for accurately positioning a magnetic head with respect to a recording medium.

29. A method of increasing the spatial density of magnetic data recording and reproduction, comprising:

providing a rotating magnetic disk; and

providing a coarse positioning mechanism that holds a fine positioning mechanism and provides coarse positioning of the magnetic head with respect to the magnetic disk;

wherein the fine positioning mechanism holds a magnetic head and is attached to the coarse positioning mechanism, the fine positioning mechanism having a head-holding substrate comprising a fired glass-ceramic compact and all surfaces of the substrate are fired, and

wherein the fine positioning mechanism has piezoelectric elements to alter the position of the magnetic head in response to an applied voltage.